

CHAPTER 1

INTRODUCTION

1.1 Background of Research

Styrofoam or most known as polystyrene was widely used as food packaging and to protect the product from damage during transport or storage, but nowadays it was use in innovative building material that lends to design and structural integrity of many building projects. Polystyrene or Expanded Polystyrene (EPS) has powerful design element and ideal choice for green building design. For an example, the uses of lightweight concrete for wall panel in construction building have seem to give many advantages compare than conventional brickwork method in term of the minimizing labour and material cost. Therefore, to overcome this weakness, the lightweight concrete is chosen as an alternative solution.

In addition, with the existing this new technology it was able to speed up the construction progress which is the construction speed could be faster by using lightweight concrete in precast construction. Furthermore, it was lighter loads during construction, reduced self-weight in structures and increased thermal resistance and the most important advantages of using lightweight concrete is the possible decrease in construction

Lightweight concrete is generally accepted as concrete having a density around 1440 up to 1800kg/m³ compare than the normal weight concrete with density around 2240 to 2400 kg/m³. Therefore, many researches have been carried out new alternative in order to enhance the performance of lightweight concrete wall panel.

However, this research focuses on the design of a lightweight concrete wall panel to analyse the relationship between the loads applying with the deflection of the wall panel. Hence, twelve (12) samples of wall panel were prepared with the different ratio and percentages amount of polystyrene to investigate the behaviour of the polystyrene beads in the concrete mixture.

1.2 Problem Statement

Nowadays, lightweight concrete are used in various construction industry. This is because there are many beneficial use of a structural lightweight concrete such as reduce the weight of structure, which then allow the structural designer to come out with the innovative idea in construction field. As we know, wall panel is widely used in building construction such as partition and carrying load but in order to construct the wall, it was need a lot of time especially in multi-storied and high rise building. Therefore, the construction of the project became slower if use the conventional brickwork method due to require for constructing the partition work and to create many of internal unit. In addition, it was required a lot of manpower from the beginning of the project until the finishing work. Hence, it was seem like to have a better performance in construction industry to replace the conventional brickwork method. Moreover, by using lightweight concrete it was able to overcome this problem which is it can speed up the construction progress. The construction speed could be faster by using lightweight concrete in precast construction. So, this innovative idea was suggested which it will reduce the time of construction, manpower and minimize the uses of raw materials such as granite and gravel that was decreasing in day by day.

Furthermore, primary reason of using lightweight concrete for structural purposes is to reduce the self-weight of the concrete structures. Reducing the self-weight of the structures is vital for the structural safety. Besides the construction works become easier because the use of lightweight concrete in the field of precast concrete wall structures.

However, there was some problem in order to produce a good quality of lightweight concrete. This is because the mixture is very sensitive with water content and it was also difficult to place because of the porosity and angularity of the aggregate. In some mixes, it may separate the polystyrene and float toward surface if the excessive water ratio poured. Hence, the skill of mixing was required during handle this process. Besides, mixing time is longer than conventional concrete to ensure the lightweight concrete was proper mixing.

1.3 Objective of Study

- i. To determine the compressive strength of the lightweight concrete to produce the wall panel.
- ii. To determine the ultimate load that unreinforced wall can sustain when use the polystyrene as an aggregate replacement based on (BS 8110:97)
- iii. To check the deflection on the wall panel.

1.4 Scope of Study

Basically, this research covered the construction of lightweight concrete wall panel for the housing building application. The main focus of this study is to design the lightweight concrete wall panel to determine the compressive strength to be used as wall panel. This study also to determine the ultimate load of unreinforced concrete wall can sustain when use the polystyrene as an aggregate replacement. In addition, this research was carried out in order to check the deflection of the wall panel. The deflection is very important indicator in order to determine the characteristic of the lightweight concrete mixing.